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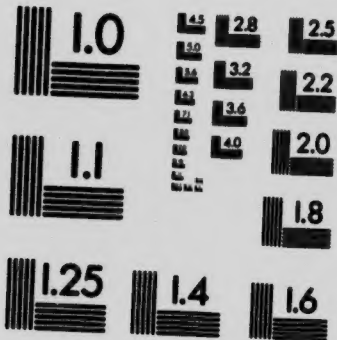


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DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
EXPERIMENTAL FARMS

EXPERIMENTS IN STEER FEEDING IN MANITOBA

A Summary of Tests at the Experimental Farm, Brandon,
Manitoba, from 1892 to 1912

BY
W. G. McKILLICAN, B.S.A.
Superintendent, Experimental Farm, Brandon, Man.

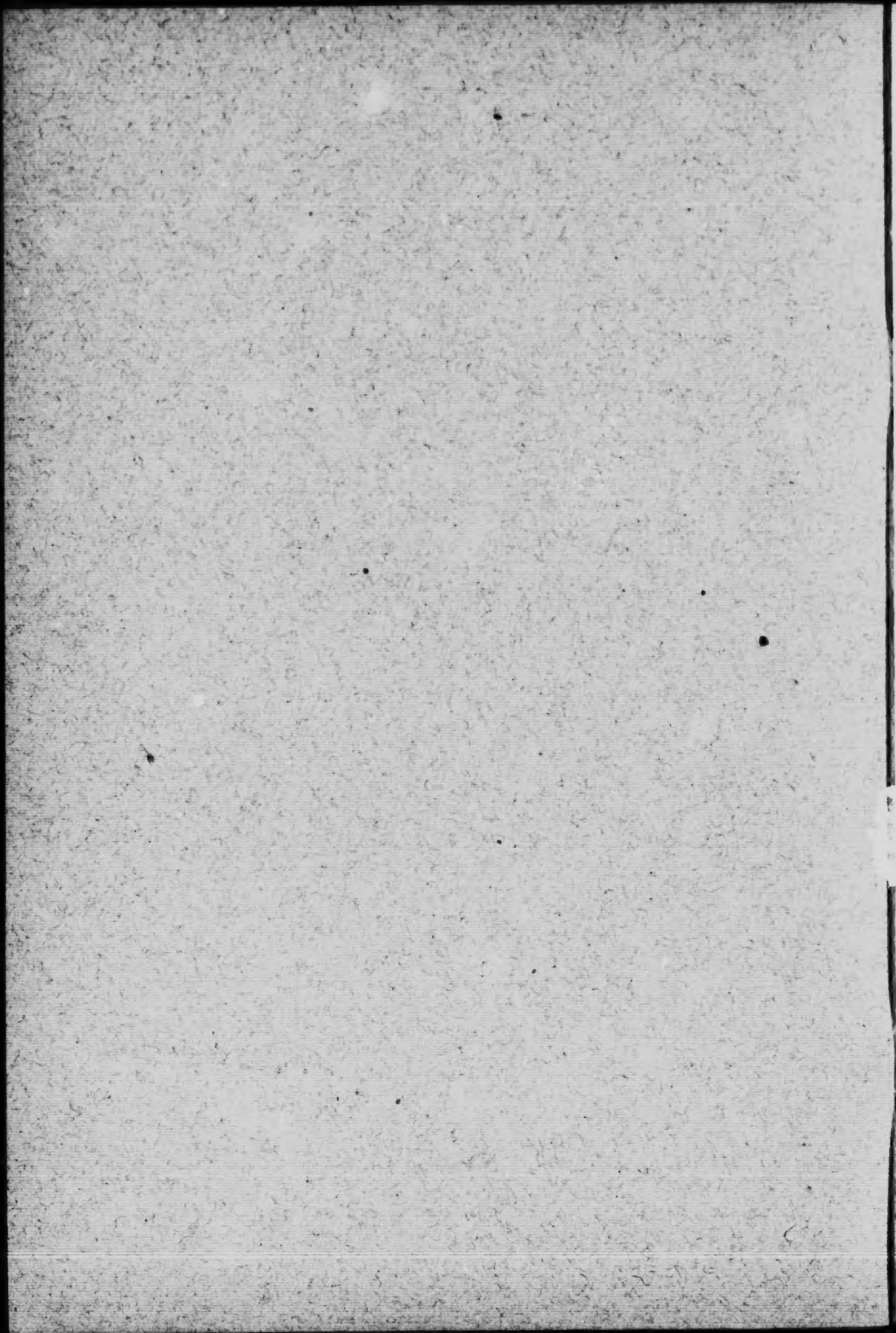
BULLETIN No. 13

Second Series

Bulletins of the Second Series of the Bulletins of the Experimental Farms treat of such subjects as are of interest to a limited class of readers and are mailed only to those to whom the information is likely to be useful.

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ction of the Hon. MARTIN BURRELL, Minister of Agriculture, Ottawa, Ont.



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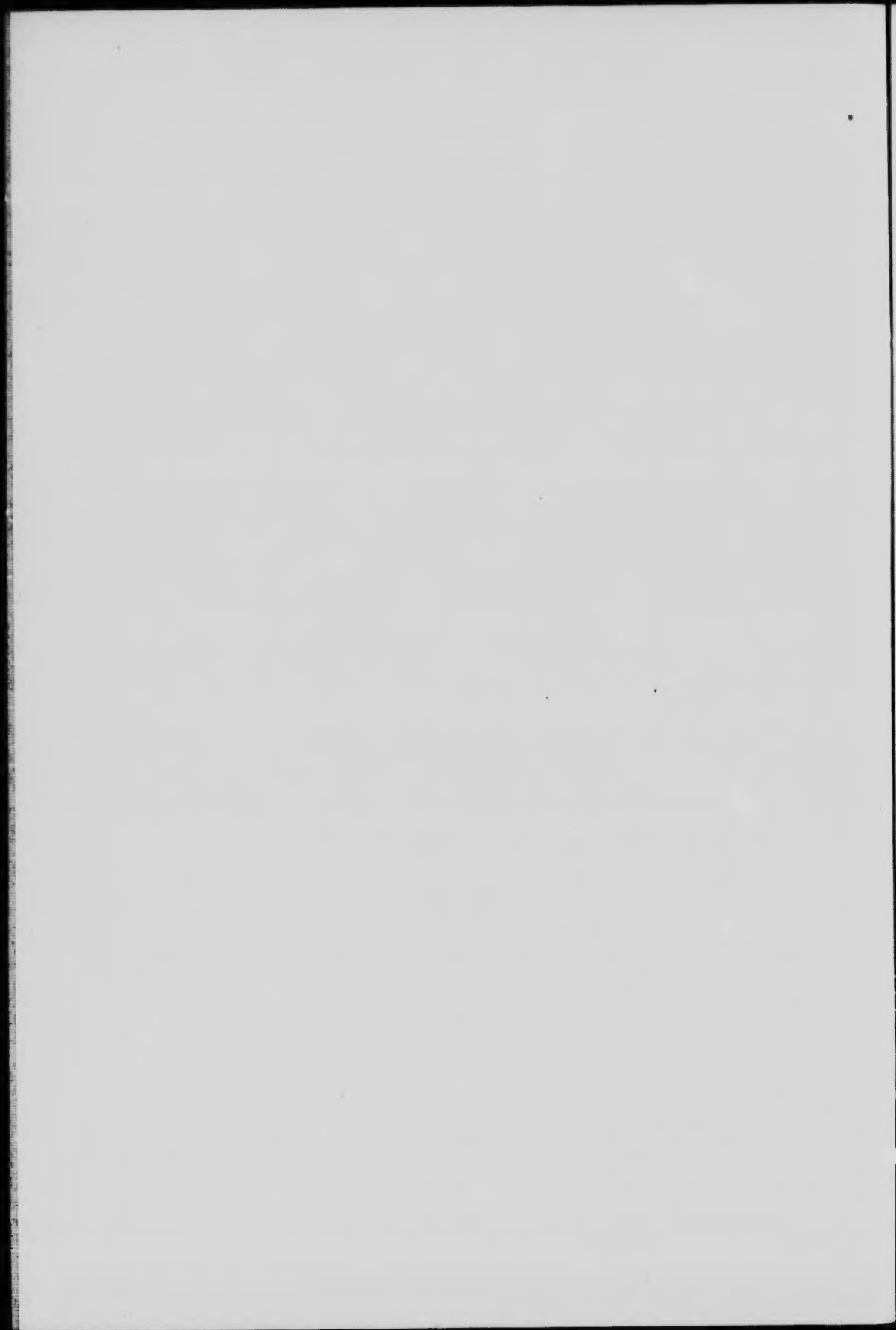
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Published by direction of the Hon. MARTIN BURRELL, Minister of Agriculture, Ottawa, Ont.



The Honourable,
THE MINISTER OF AGRICULTURE,
Ottawa.

SIR,—I beg to submit herewith, for your approval, Bulletin No. 13 of the Second Series, on Experiments in Steer Feeding in Manitoba, prepared by Mr. W. C. McKillican, Superintendent of the Experimental Farm at Brandon, Manitoba.

The complete resumé of the beef-feeding experiments carried on at the Brandon Experimental Farm during the past twenty years, as presented in this Bulletin, should be both interesting and instructive to Manitoban farmers. The problems dealt with include the testing of the comparative values of different feeds, both roughage and concentrates, as produced on the prairies, as well as investigations into methods of housing, systems of handling and ages of animals fed. The results as reported go to show that beef-production in Manitoba, under a great diversity of conditions and with a great variety of feeds, is likely to prove fairly remunerative and quite possible on almost any, even the most poorly equipped, farm. This fact should induce more of our prairie farmers to attempt to convert their otherwise waste products, such as straw and screenings, as well as part of their cheap coarse grains, into good, marketable beef.

This, and its companion bulletin, No. 12 of the Second Series, on Feeding for Beef in Central Alberta, are both well worth the most careful perusal of every farmer in the provinces of Manitoba, Saskatchewan and Alberta.

I have the honour to be, Sir,
Your obedient servant,

J. H. GRISDALE.

Director, Dominion Experimental Farms.

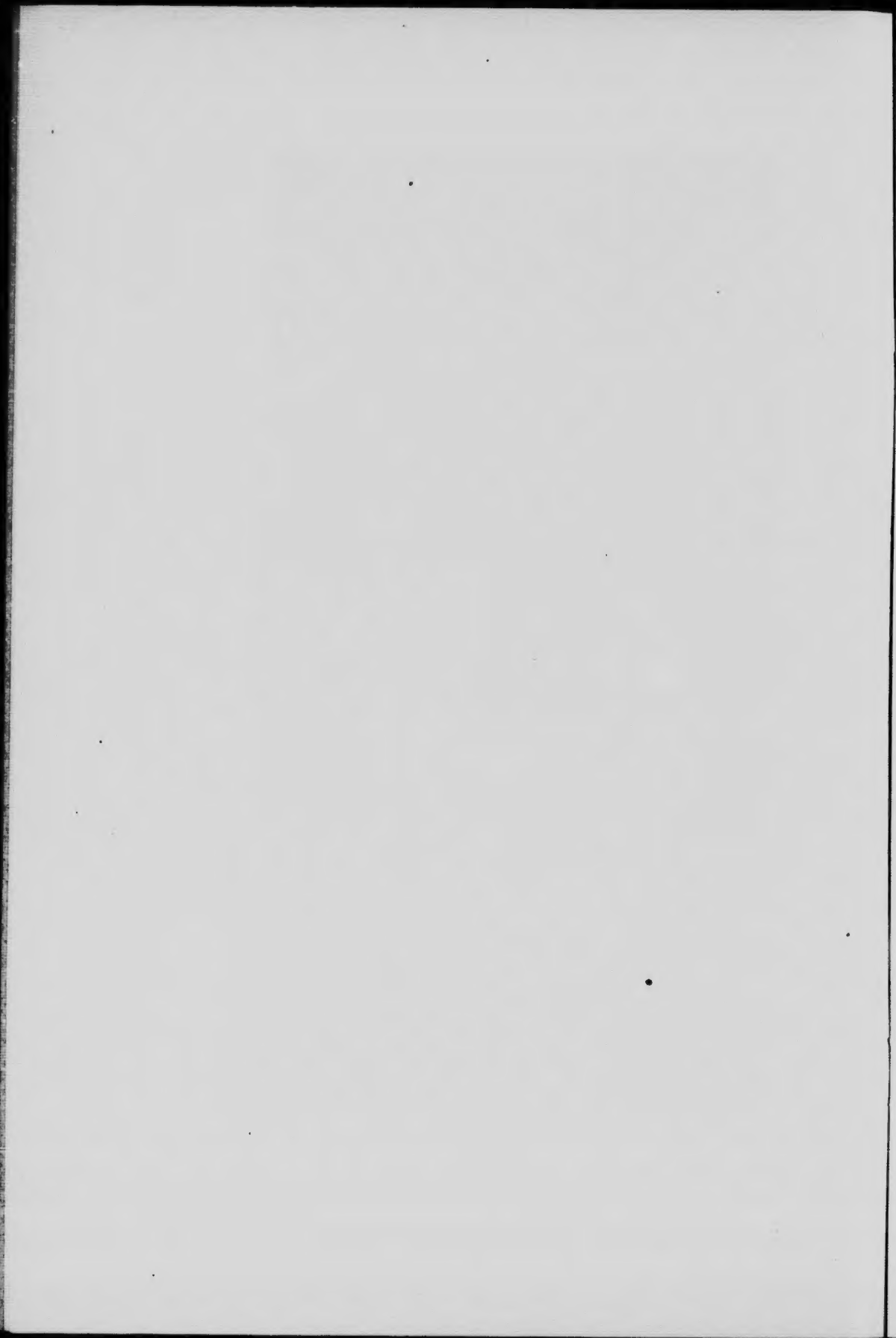
Ottawa March 25th, 1913.



Feeding Stern in the Open in Maui, Oa.

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EXPERIMENTS IN STEER FEEDING IN MANITOBA.

Interest in beef-raising and all forms of mixed farming in Manitoba is increasing. There is a growing belief that exclusive grain-growing with its attendant evils of soil depletion, increase of weeds and congestion of labour in certain months of the year, must gradually be replaced by a more balanced system of agriculture. This publication is offered to the farmers of Manitoba in order to show that the products of the soil may be marketed profitably in the form of beef, and to throw what light these experiments reveal on the methods likely to give best results. No attempt has been made to write a general treatise on beef raising, but simply to report in concise form the experimental work in steer feeding done on the Experimental Farm at Brandon during the past twenty years.

The writer wishes to give credit to former Superintendents, Mr. S.A. Bedford, Mr. N. Wolverton and Mr. Jas. Murray, for most of the work reported. Experiments up to 1905 were supervised by Mr. Bedford; Mr. Wolverton was in charge in 1906; the work in 1907, 1908, 1909, 1910 and part of 1911 was under the charge of Mr. Murray. The present Superintendent is responsible for the completion of the experiments of 1911 and the work of 1912.

The custom of allowing the value of the manure to balance labour and interest has been followed in these experiments as is commonly the practice in reporting such work. This plan will probably meet with criticism, as not being in accordance with Manitoban ideas on the subject. There are, however, several reasons why these items of cost and returns should be allowed to balance each other in these reports. In the first place, the steers were handled experimentally, often in small groups, and their feed always weighed out to them. Thus the actual cost of the labour spent on them was much greater than it would be under practical farm conditions. The reporting of the actual cost of labour would therefore be misleading and any other estimate would be only a guess. The value placed on the labour spent on feeding cattle will vary greatly under different circumstances. Sometimes a man has a direct choice between work of this kind and comparative idleness; in such a case, the allowance for labour would not need to be so great as where extra help would have to be hired. Then the improvement in the quality of help that can be gained through offering year-round work is a consideration. Further, we believe that those who criticize the balancing of labour against manure, underestimate the value of manure, and that when its effect in keeping up the condition of the soil and increasing crop production is more fully realized, the profits shown will be allowed to pass as real profits. For those who are not prepared to work on this basis, there is the alternative of estimating what the labour will cost under their own circumstances and reducing the returns accordingly.

FROZEN WHEAT vs. BARLEY.

Experiments were tried in 1892 and 1893 to compare frozen wheat with barley as feed for fattening steers. At this time frosts were a great difficulty in growing wheat and frosted wheat sold at about 25 to 30 cents per bushel. The experiments were conducted to determine whether frozen wheat could be marketed more profitably by feeding it, and also compare it with barley as a feed, barley being a crop that could be grown without danger of frost.

The experiment in 1892 does not give a direct comparison between frosted wheat and barley, as the latter was fed in combination with hay as well as

straw, while the wheat was fed with straw as the only roughage. The steers fed barley and hay made a profit of \$17.08 each, and gained 1.9 lbs. per day, the ones fed frozen wheat made a profit of \$10.76 each and gained 1.7 lbs per day. The use of the frozen wheat for steer feeding was most satisfactory, as it gave a return of 56 cents per bushel for wheat that would otherwise have been sold for 30 cents per bushel. The steers were bought for $2\frac{3}{4}$ cents per pound, and were sold at 4 cents per pound.

In 1893, a direct comparison was made between frozen wheat and barley with the following result:

	Profit per steer.	Average gain per day.
Steers fed on frozen wheat.....	\$ 12.30	1 lb. 3 oz.
Steers fed on barley.....	10.53	1 lb. 13 oz.

This shows that barley was the better feed for the steers, causing a greater gain in weight, but that the frozen wheat, on account of its very low market value, was the more profitable feed to use.

The results of this year's experiment showed that wheat that had a market value of only 25 cents a bushel was raised to 68 cents per bushel when fed to steers which were bought at $2\frac{1}{2}$ cents in the fall and sold for $3\frac{1}{2}$ cents in the spring.

While these results are based on prices entirely different from those ruling at the present day, still the prices of grain and of steers are in keeping with each other and thus the results have a bearing on present conditions, when prices are higher.

TURNIPS vs. NO TURNIPS.

In 1892 and 1893, experiments were conducted to see if it were necessary to have turnips in order to feed steers successfully. Farmers who had fed in Eastern Canada or Britain considered turnips as absolutely necessary. As the people of the West were unwilling or lacked the help to grow turnips, these experiments were undertaken to determine if success were possible without them, and what advantage would be gained if they could be added to the ration. The feed used was chopped frozen wheat and cut straw.

AVERAGE RESULTS OF 1892 AND 1893.

Steers Fed.	Profit per steer.	Average gain per day.
With turnips.....	\$ 11.53	1 lb. 7 oz.
Without turnips.....	12.47	1 lb. $4\frac{1}{2}$ oz.

The results show that turnips are not necessary to give good results, in fact with grain so cheap as it was at that time, a greater profit was obtained without turnips. However, the average gain in weight per day of the steers showed that they fattened better when fed with turnips and the experimenter notes that those fed on wheat and straw alone were "off their feed" several times, while those that received turnips were always ready for their feed.

We believe that with present prices for grain, the addition of turnips to a ration would not only increase the daily gain but also the net profit.

However, the main result for which the experiment was undertaken still holds good, viz., no Manitoban farmer need refrain from steer feeding because he has no turnips.

NATIVE HAY VS. OAT SHEAVES.

In 1895 and 1897, experiments were carried on in which oat sheaves were compared as to feeding value with native hay. The oats were cut just as the topmost oat in the head was turning colour. Both hay and oats were run through a straw cutter. In 1895, both lots received the same ration of the oat chop. The native hay was valued at \$5 per ton both years and the oat sheaves at \$7.50 per ton in 1895, and at \$5 per ton in 1897.

AVERAGE RESULTS FOR TWO YEARS.

Steers Fed.	Profit per steer.	Average gain per day.
Native hay.....	\$ 16.42	1 lb. 9½ oz.
Oat sheaves.....	15.78	1 lb. 11 oz.

In reporting these experiments, Mr. Bedford made the following comments: "Where native hay is not procurable, oat sheaves cut before ripe make an excellent substitute. The yield of oat sheaves on this farm ran from two and a half to four tons per acre.

"It would appear that the cultivated native hay is worth rather more per ton than oat sheaves for fattening purposes.

The yield of hay from this grass averages somewhat less than the yield of oat sheaves under the same conditions."

HAY VS. STRAW.

In 1898, a comparison was made between marsh hay and mixed straw as the roughage in a feeding ration. The steers all received turnips and barley chop, but those that were fed hay received two pounds per day less chop than the straw-fed lot. The hay was valued at \$5 per ton and the straw at that time was considered of no value and given free. The results were as follows:

Steers Fed.	Profit per steer.	Average gain per day.
Marsh Hay.....	\$ 7 54	1 lb. 6 oz.
Straw (mixed kinds).....	10 91	1 lb. 4 oz.

It would appear from this test that hay is not essential to the successful fattening of steers, and our numerous grain farmers can utilize to good advantage a portion of their straw for that purpose.

Tests conducted more recently in the comparison of outdoor and inside feeding tend to confirm this conclusion, viz., that good results can be obtained with straw as the only roughage.

BROME GRASS HAY VS. WESTERN RYE GRASS HAY VS. SPELTZ STRAW.

The experiment, which was tried in 1902, was a comparison of Brome Grass hay, Western Rye Grass hay and Speltz straw. All animals received the same quantity of turnips and mixed grain chop. The allowance of chop varied from 6 pounds per steer at the beginning of the term to 11 pounds at the end. Both kinds of hay were valued at \$5 per ton and the Speltz straw was valued at \$2.50 per ton.

RESULTS, 1902.

Steers Fed.	Profit per steer.	Average gain per day.
Brome Grass Hay.....	\$ 6 61	2 lbs.
Western Rye Grass Hay.....	6 60	2 lbs.
Speltz Straw.....	6 59	1.1 lbs.

The steers were all sold at the same price but those fed on Speltz straw were not fully finished and in a discriminating market would have brought at least a cent a pound less than the others.

The result of the experiment would lead to the following conclusions:

(a) That Western Rye Grass and Brome Grass hay are about equal in feeding value for beef.

(b) That Speltz straw makes a very fair coarse fodder but is only worth one-half as much as well-cured hay.

BROME GRASS HAY vs. FODDER CORN.

A test of Brome Grass hay vs. Fodder Corn was made in 1903. The Brome Grass was cut early and well cured. The fodder corn was an early variety cut when in the late milk stage, well cured in the stooks outside and drawn in as it was wanted. The lot that were fed Brome Grass hay received 20 pounds per day throughout the test; the lot fed fodder corn received from 24 to 30 lbs. per day, averaging about 27 lbs. per day. The hay was valued at \$5 per ton, and the corn at \$4 per ton. They all received the same quantity of turnips, mixed chop and bran.

RESULTS.

Steers Fed.	Profit per steer.	Average gain per day.
Brome Grass Hay.....	\$0 64.....	1 lb. 10 oz.
Fodder Corn.....	0 71.....	1 lb. 12 oz.

Mr. Bedford's conclusions on this experiment were:

"1st. There is very little profit in feeding steers when the difference between the buying and selling price is only about 75c. per cwt.

"2nd. That cattle require more pounds of fodder corn per day than they do of Brome Grass hay.

"3rd. That the comparative value of the two fodder crops is about \$4 per ton for fodder corn and \$5 per ton for Brome Grass hay.

OAT SHEAVES vs. FODDER CORN.

During the winter of 1906, an experiment was conducted to compare the value of oat sheaves and fodder corn for beef production. One lot of steers was fed 20 lbs. of oat sheaves per day and the other lot received 23 lbs. of dry corn fodder. In addition to this, all received the same ration of ensilage, roots and mixed chop. The fodder corn was valued at \$4 per ton and the oat sheaves at \$6 per ton.

RESULTS 1906.

Steers Fed.	Profit per steer.	Average gain per day.
Oat Sheaves.....	\$6 10.....	1 lb. 8 oz.
Corn Fodder.....	6 93.....	1 lb. 6 oz.

ALFALFA INSTEAD OF PART OF GRAIN RATION.

Alfalfa was put on test against oats and barley chop in the experiment conducted in 1911. The steers that were stall-fed that season were divided into two equal lots. One lot got the usual ration. The other lot was fed exactly the same during the first six weeks, but during all the rest of the feeding period, received 3 lbs. less chop per day and in its place got 3 lbs. of cut alfalfa. Both lots were fed 8 lbs. of straw, 35 lbs. of corn silage, and 15 lbs. of roots daily. One lot started with 2 lbs. of grain apiece which was gradually increased to 13 lbs. The other lot started on 2 lbs. of grain apiece which was gradually increased to 10 lbs. of grain and 3 lbs. of alfalfa. The grain was mixed oats and barley and was charged against the steers at \$20 per ton; the alfalfa was charged at \$12 per ton.

RESULTS.

	Profit per steer	Average gain per day.
Without Alfalfa.....	\$23 86.....	1.34 lbs.
With Alfalfa.....	24 84.....	1.3 "

These results would lead to the conclusion that as part of a feeding ration alfalfa hay is practically equal to the same weight of oats and barley chop.

TIED VS. LOOSE AND THE EFFECT OF DEHORNING.

During the seasons of 1900 and 1901, an experiment was conducted in which a comparison was made between feeding steers tied-up and feeding them loose in box stalls. At the same time the effect of dehorning was tested.

One lot of steers was left horned and kept tied up. One lot was dehorned and kept tied up. A third lot was dehorned and kept in a box stall.

AVERAGE RESULTS—2 YEARS.

	Profit per steer.	Average gain per day.
Horned (Tied).....	\$4 47.....	1.5 lbs.
Dehorned (Tied).....	3 19.....	1.3 "
Dehorned (Loose).....	4 38.....	1.5 "

Mr. Bedford makes this comment on the experiments. "This experiment would lead us to the conclusion that dehorning has very little effect on the fattening of the animals".

This experiment was repeated in 1909, but the dehorned tied lot was not included in the test.

RESULT IN 1909.

	Profit per steer.	Average gain per
Horned (Tied).....	\$ 5 79.....	1.2
Dehorned (Loose).....	10 45.....	1.7 "

This test shows a decided advantage in the practice of dehorning steers and feeding them loose in a box stall. As this result is confirmed by the results of the experimenters elsewhere, we believe that the loose feeding of steers may justly be advocated as the better practice.

TWO-YEAR-OLDS vs. YEARLINGS.

In order to obtain information as to the best age at which to fatten steers, experiments were carried on in 1904 and 1905 in which yearling steers were compared with two-year-olds. The yearlings were about 18 months at the beginning of the test and the two-year-olds were about 30 months. They were given the same feed but the two-year-olds were allowed a slightly larger quantity per steer. The ration consisted of corn fodder, corn ensilage, oat straw, turnips, bran and chopped grain. The experiment was conducted with a very narrow margin between buying and selling prices. Both years they were bought for $3\frac{1}{4}$ cts. per lb. and one year they were sold for 4 cts. per lb. and the other year for $4\frac{1}{4}$ cts. per lb., hence the profits were small.

AVERAGE RESULTS—2 YEARS.

Age of Steers.	Profit per steer.	Average gain per day.
2 Year old.....	\$2 87.....	1 lb. 9 oz.
Yearling.....	2 03.....	1 lb. 11 oz.

Mr. Bedford's conclusions were as follows:

1st. The amount of gain in weight per day is practically the same with each lot of steers.

2nd. The two-year-olds were in both instances more profitable than the one-year-olds.

TWO-YEAR-OLDS vs. THREE-YEAR-OLDS.

A lot of two-year-old steers was compared in 1907 with three-year-olds. Both were fed the same ration, the three-year-olds getting a larger quantity in proportion to their weight. The ration consisted of straw, silage, hay, roots, and grain. The results were as follows:

RESULTS 1907.

Age of Steers.	Profit per steer.	Average gain per steer.
Two years.....	\$8 99.....	2.1 lbs.
Three years.....	6.66.....	1.7 "

This would appear to give two-year-olds a decided advantage over the older animals.

OUTSIDE vs. INSIDE.

Starting in the fall of 1907 and continuing each season until 1912, an experiment has been conducted to test the practicability of fattening steers outdoors, and to compare the profit of feeding in that way with that obtained from the usual method of feeding in a stable.

Mr. James Murray, who started the experiment, gives the reasons for doing so as follows:

"For a number of years, the cattle feeding business in Manitoba has been on the wane owing largely to the low prices that have ruled for beef. The small profits to be realized have been out of proportion to the amount of capital required for buildings and equipment and the cost of labour. The value of the manure, which is considered by many cattle feeders as equivalent to the cost of labour, is not generally regarded so in Manitoba. The inducement to feed cattle has to be, therefore, that it offers a better market for the coarse grains than to sell them directly off the farm. The tendency to grow more oats and barley is becoming greater every year as their usefulness as cleaning crops is demonstrated, and, as diversified farming becomes more general, their growth will be stimulated further.

One of the deterring factors to the more extensive feeding of steers has been the amount of capital required to house them in comfortable quarters. Buildings of any kind are expensive, and those that are strictly essential are generally all that the average farmer cares to build. He is quite reasonably averse to putting money into buildings in which to feed stock when the profits from feeding are, at most, meagre. To overcome this serious objection, a system of feeding has been advocated in which the cattle are allowed to run outside without any shelter. The strongest advocates of this system are men who have been practising it successfully for several years. By this method, the stock, steers of about 1,100 to 1,300 pounds, kept in the open throughout the winter, are fed straw and chopped grain and allowed abundance of water. The claim is made that steers handled in this way make good gains economically, do not suffer from the cold, and can be handled with infinitely less care and with the outlay of much less capital than when comfortable quarters are provided."

The equipment provided for the first winter consisted of nothing more than a straw rack made of poles and large enough to hold two or three sleighloads of straw, and a plank trough 16 feet long and 3 feet wide. The only outlay was a few cents for the plank in the trough and the time necessary to construct the rack and trough. No artificial shelter of any kind was provided. The site chosen was one that provided good natural shelter; it is a south slope and is a small clearing in a thick growth of scrub oak.

During the first two winters the cattle got their drinking water from a stream in a coulée nearby. This was not entirely satisfactory as it meant chopping the ice every day, and, if a steer did not drink soon after the hole was opened, he lost his chance for that day. For the third season, a well was sunk, a large trough provided and a tank heater put in the trough. A very small quantity of coal burned in the tank heater will keep the ice off the water in the trough. This system has been used each year since it was adopted and has given satisfaction. The outlay for the tank heater was \$8, the cost of a trough will vary with the construction and can easily be estimated by anyone interested.

RESULTS IN 1908.

The inside lot was started on Dec. 5th, 1907, on a ration consisting of silage, 25 pounds; straw, 8 pounds; hay, 4 pounds; roots, 10 pounds; grain, 4 pounds. The grain ration was increased from time to time until by the first of April each animal was receiving 10 pounds of grain per day.

The outside lot had oat straw before them at all times and was fed grain in the same proportion as those inside. During the last three weeks of the experiment, coarse slough hay was substituted for the straw, the supply of which gave out. The grain was fed twice daily and water was available in a neighbouring coulée.

Three of the steers that were stabled had to be dropped from the test before it was complete, so that five only are included in the results. Both lots were sold April 20th, for \$4.25 per hundred. In considering the results which follow, it should be borne in mind that the winter of 1907-8 was an unusually mild one,

the mean temperature of January and February being 10.5 and 9.2 respectively, above the average. The mean temperatures the five months the cattle were on feed were as follows: December 13.3; January, 7.3; February, 7.4; March, 10.0; April, 39.0.

RESULTS.

	Outside.	Inside.
Number of steers in lot.....	8	5
First weight, gross.....	8,834 lbs.	5,005 lbs.
" average.....	1,106 "	1,139 "
Finished weight, gross.....	10,630 "	6,950 "
" average.....	1,328 "	1,390 "
Total gain in 138 days.....	1,776 "	1,255 "
Average gain per steer.....	234 "	251 "
Daily gain per steer.....	1.6 "	1.81 "
lot.....	12.8 "	9.05 "
Gross cost of feed.....	\$100 76	\$77 95
Cost of 100 lbs. gain.....	\$ 5 67	\$ 6 20
Cost of steers—		
8,848 lbs. at 3½c.....	\$276 50	
5,005 lbs. at 3½c.....		\$177 97
Total cost to produce beef.....	\$377 26	\$255 92
Sold—14,135 lbs. at 4½c., less 4 per cent.....	\$433 71	
6,950 lbs. at 4½c., less 4 per cent.....		\$263 56
Profit on lot.....	\$ 56 45	\$ 27 64
Net profit per steer.....	\$ 7 05	\$ 5 52
Average buying price per steer.....	\$ 34 56	\$ 35 59
Average selling price per steer.....	\$ 54 21	\$ 56 71
Average increase in value.....	\$ 19 65	\$ 21 12
Average cost of feed per steer.....	\$ 12 59	\$ 15 59
Amount of meal eaten by lot.....	8,892 lbs.	5,390 lbs.
Amount of straw.....	3 tons	5,690 "
Amount of hay.....	6 "	2,840 "
Amount of millet.....	1 "	
Amount of ensilage and roots.....		25,850 "
Amount of corn fodder.....	1 ton	

RESULTS IN 1909.

Forty head of steers rising three years, were bought at \$3.25 per hundred, and the test commenced on December 7th, 1908. They weighed about 150 pounds per head lighter than those fed the year before, averaging only 968 lbs. and a number were of poor conformation. The steers were divided into three lots, four were fed loose in a box stall, sixteen were tied in the stable and twenty were fed outside.

The outside lot was fed oat straw for roughage during most of the period, with some hay during the last six weeks. Those in the loose box were fed exactly the same as those outside. Those tied in the stable were fed silage, a few roots, straw and chopped grain, the same as the year before.

The grain ration was light to begin with, being four pounds per day, one half bran and one half barley and oat chop. This amount of grain was gradually increased until, by the first of April, they were receiving twelve pounds per day.

This amount was continued until they were sold on May 10th, 1909.

The following prices were charged for feed:

	Per ton.
Grain.....	\$20 00
Bran.....	18 00
Ground Flax.....	30 00
Straw.....	1 00
Prairie Hay.....	4 00
Alfalfa.....	6 00
Ensilage.....	2 00
Oat Sheaves.....	3 00

RESULTS IN 1909.

	Outside.	Inside (tied.)	Inside (loose.)
Number of steers in lot.....	20	16	4
First weight gross.....	19,835 lbs.	15,020 lbs.	4,070 lbs.
" average.....	991 1/2 "	938 "	1,017 "
Finished weight, gross.....	22,020 "	17,973 "	5,110 "
" average.....	1,101 "	1,124 "	1,277 "
Total gain in 154 days.....	2,385 "	2,953 "	1,040 "
Average gain per steer.....	119 "	184 "	260 "
Daily gain per steer.....	.77 "	1.2 "	1.6 "
" lot.....	15.4 "	19.2 "	6.4 "
Gross cost of feed.....	\$379 04	\$367 81	\$ 70 91
Cost of 100 pounds gain.....	\$ 13 89	\$ 9 05	\$ 6 81
Cost of steers—19,835 lbs. at 3 1/2c.....	\$638 14		
15,020 lbs. at 3 1/2c.....		\$488 16	
4,070 lbs. at 3 1/2c.....			\$132 27
Total cost to produce beef.....	\$1,017 18	\$755 96	\$203 18
Sold—17,980 lbs. at 5c., less 5 per cent.....	\$854 05		
16,900 lbs. at 5c., less 5 per cent.....		\$802 75	
5,110 lbs. at 5c., less 5 per cent.....			\$342 75
Sold—4,040 lbs. at 4 1/2c., less 5 per cent.....	\$172 71		
1,075 lbs. at 4 1/2c., less 5 per cent.....		\$ 45 99	
Profit on lot.....	\$ 9 58	\$ 92 78	\$ 39 57
Net profit per steer.....	\$ 47 "	\$ 5 79 "	\$ 9 89 "
Average buying price per steer.....	\$ 31 90	\$ 30 51	\$ 33 07
" selling price per steer.....	\$ 51 33	\$ 53 04	\$ 60 09
" increase in value per steer.....	\$ 19 43	\$ 22 53	\$ 27 62
" cost of feed per steer.....	\$ 18 93	\$ 16 74	\$ 17 75
Amount of grain eaten by lot.....	23,980 lbs.	16,112 lbs.	4,724 lbs.
" straw eaten by lot.....	52,000 "	23,408 "	4,800 "
" hay eaten by lot.....	34,000 "		5,900 "
" alfalfa eaten by lot.....	4,000 "		
" ground flax eaten by lot.....	140 "	224 lbs.	56 lbs.
" bran eaten by lot.....	3,400 "	2,768 "	764 "
" ensilage eaten by lot.....		43,200 "	
" roots eaten by lot.....		17,068 "	
" oat chaffs eaten by lot.....		6,240 "	

The following prices were obtained for oats and barley in marketing them in this way, after allowing for the bran at actual cost and other feeds at the valuation given above.

	Outside.	Inside. (loose).	Inside. (tied).
Oats and barley per ton.....	\$20 78	\$36 73	\$31 51
Oats per bushel.....	35	62	53
Barley per bushel.....	49	88	75

These prices are higher in every case than the ruling price for these grains in that season.

RESULTS IN 1910.

In this season, several changes were made in the method of feeding the outside steers. In previous years, oat straw was the principal roughage used. This was fed until March or April, after which time hay was substituted. The grain ration during the first two seasons was limited throughout the feeding period. About four pounds per head was fed at the start. This quantity was gradually increased, about twelve pounds per day being fed toward the close the period.

This year, the hay that was available was fed from the start when the grain ration was light, and when the grain ration approached full feed, oat straw was substituted. The grain ration was also heavier than in previous years. Four

pounds per day was the ration December 1st, and this was increased slightly every week so that by the end of January it was 15 pounds per day. After this date the steers were given practically all the grain they would clean up—this averaged about 17 pounds per day and occasionally was as much as 20 lbs.

Those inside were given the same feed and care as in previous years.

The following prices were charged for feed:—

	Per ton.
Grain.....	\$20 00
Bran.....	18 00
Linseed meal.....	30 00
Slough hay.....	4 00
Straw.....	1 00
Ensilage.....	2 00
Roots.....	2 00

RESULTS.

	Outside.	Inside.
Number of steers in lot.....	20	16
First weight gross.....	20,000 lbs.	16,755 lbs.
" average.....	1,048 "	1,047 "
Finished weight, gross.....	24,150 "	20,630 "
" average.....	1,207 "	1,289 "
Total gain in 155 days.....	3,150 "	3,875 "
Average gain per steer.....	157.5 "	242 "
Daily gain per steer.....	1.0 "	1.66 "
lot.....	20 "	24.9 "
Gross cost of feed.....	\$ 891 29	\$ 292 05
Cost of 100 pounds gain.....	\$ 18 53	\$ 7 73
steers.....	\$ 707 40	\$ 565 46
Total cost to produce beef.....	\$1,208 00	\$ 857 83
Sold—24,150 lbs. at 8½c., less 5 per cent.	\$1,201 85	
20,630 lbs. at 8½c., less 5 per cent.		\$1,077 87
Profit on lot—none—loss.....	\$ 36 84	\$ 230 34
Net profit per steer—none—loss.....	\$ 1 84	\$ 13 77
Average buying price.....	\$ 35 37	\$ 35 33
selling price.....	\$ 63 07	\$ 67 36
increase in value.....	\$ 27 72	\$ 32 03
cost of feed per steer.....	\$ 29 57	\$ 18 25
Amount of grain eaten by lot.....	43,906 lbs.	15,994 lbs.
" linseed meal.....	930 "	744 "
" bran.....	930 "	736 "
" hay.....	20 tons	7,312 "
" straw.....	14 "	14,315 "
" ensilage.....		84,880 "
" roots.....		9,216 "

The method of feeding adopted for the outside steers gave disastrous results. When the hay was replaced by straw, the steers refused to eat the straw. As they were given all the grain they would eat, they lived almost entirely on grain with the result that they scoured badly and lost weight instead of gaining.

Results obtained in years before and after this test lead us to believe that these losses were due to the system of feeding rather than to the fact that the steers were outdoors.

RESULTS IN 1911.

Twenty-one steers were purchased at \$33 per head. They averaged 1,053 lbs. which made the purchase price \$3.13 per cwt. The experiment was started on Nov. 15th, 1910, and the steers were sold on May 1st, for \$6.30 per cwt.

As usual, one lot was fed outside; however, they were fed differently from 1910, in that they received straw at first and got only a little hay at the finish.

The grain was limited to what they could use properly, starting at 2 lbs. per day and finishing at 14 lbs.

Two lots were fed in the stable, one receiving alfalfa, and the other not. In this part of the report, we shall consider only the group that received no alfalfa, as the comparison of two inside groups has been recorded elsewhere.

The inside lot which is used for this comparison received the same treatment and care as in previous years. Their ration included corn silage, straw, roots, and grain.

The following prices were charged for feed—

	Per ton
Straw.....	\$ 1 00
Mixed Hay.....	6 00
Oats and P. hay.....	20 00
Bran.....	20 00
Oil cake.....	33 00

RESULTS.

	Outside.	Inside.
No. of steers in lot.....	7	7
First weight gross Nov. 15, 1910.....	7,295 lbs.	7,430 lbs.
average.....	1,042 "	1,061 "
Finished weight gross, May 1, 1911.....	8,800 "	9,000 "
average.....	1,257 "	1,285 "
Total gain in 167 days.....	1,505 "	1,570 "
Average gain in 167 days.....	215 "	224 "
Average gain per day.....	1.29 "	1.34 "
First cost of steers.....	\$ 228 57	\$ 232 81
Total cost of feed.....	\$ 144 81	\$ 138 91
Total cost.....	\$ 373 38	\$ 371 72
Receipts from sale 8,800 lbs. at 6.30 per cwt. less 5 p.c. shrinkage.	\$ 536 68	
9,000 lbs. at 6.30 per cwt., 5 p.c. shrinkage.....		\$ 538 65
Total profit.....	\$ 163 90	\$ 166 93
Average cost per steer.....	\$ 53 65	\$ 53 26
Average cost of feed per steer.....	\$ 20 69	\$ 19 84
Average selling price per steer.....	\$ 75 24	\$ 75 95
Average profit per steer.....	\$ 21 90	\$ 23 86
Average cost of 100 lbs. gain.....	\$ 9.02	\$ 8.82
Amounts of feed used—		
Straw.....	Lbs. 24,000	9,380 lbs.
Corn silage.....	" "	39,900 "
Mixed hay.....	" 10,000	
Alfalfa hay.....	" 1,596	
Roots.....	" "	18,725 "
Oats and barley.....	" 8,501	6,737 "
Bran.....	" 210	210 "
Oil cake.....	" 371	371 "

RESULTS IN 1912.

The experiment was continued in 1912, on much the same basis as in 1911. Two lots of steers were again used. They were not as good a lot of steers. They were bought on Nov. 30th, 1911, at $4\frac{1}{4}$ c per lb. and sold on May 13th, for $6\frac{3}{4}$ c per lb.

The outside steers were fed on straw as usual. In addition, they received a small quantity of alfalfa during the last part of the period. They also received a small quantity of frozen turnips for a while during the middle of the experiment. Their grain ration started at 2 lbs. per day and finished at 15 lbs. per day.

The steers inside received the usual ration of straw, corn silage, roots and grain. A little alfalfa was also fed at the finish.

The following prices are charged for feed. It will be noted that straw is charged at \$2 per ton instead of at \$1 or nothing as in previous experiments. This decreases the apparent profit and increases the apparent cost per pound of gain.

	Per ton.
Straw.....	\$ 2 00
Oats and Barley.....	20 00
Dry corn stalks.....	5 00
Corn silage.....	2 00
Roots.....	2 00
Alfalfa.....	12 00

RESULTS.

	Outside.	Inside.
No. of steers in lot.....	12 lbs.	7
First weight gross, Nov. 30, 1911.....	11,495 "	6,535 lbs.
" average.....	938 "	978 "
Finished weight May 13, 1912.....	14,310 "	8,050 "
" average.....	1,192 "	1,150 "
Total gain in 167 days.....	2,815 "	1,215 "
Average gain per steer.....	234 "	174 "
Daily gain per steer.....	\$ 1.40	\$ 1.04
First cost of steers at 4½ cents per lb.....	\$ 483.54	\$ 290.49
Total cost of feed.....	\$ 281.49	\$ 164.92
Total cost.....	\$ 770.03	\$ 455.41
Receipts from sale at 6½ cents per lb., 5 p.c. shrinkage.....	\$ 987.63	\$ 816.20
Profit.....	\$ 217.60	\$ 60.79
Average cost per steer.....	\$ 40.71	\$ 41.50
Average cost of feed per steer.....	\$ 23.46	\$ 23.56
Average selling price per steer.....	\$ 82.30	\$ 73.74
Average profit per steer.....	\$ 18.13	\$ 8.68
Average cost of 100 lbs. gain.....	\$ 10.09	\$ 13.57
Amounts of feed used—	Lbs.	Lbs.
Oat and barley chop.....	19,792	9,762 lbs.
Straw.....	32,000	9,296 "
Dry corn stalks.....	11,000	
Corn silage.....		33,000 "
Roots.....	5,460	750 "
Alfalfa.....	3,284	1,542 "

SUMMARY OF RESULTS IN OUTSIDE VS. INSIDE FEEDING.

The following summary gives the average results of these experiments. It must be remembered that labour and interest on equipment have not been counted, neither has the value of the manure been considered. When labour and interest are counted up, they will make the outdoor feeding show up to much better advantage, as the equipment is very much cheaper and the labour only about half as great as with the stall-fed animals.

AVERAGE RESULTS.

	PROFIT PER STEER.		AVERAGE GAIN PER DAY.	
	Outside.	Inside.	Outside.	Inside.
	\$ cts.	\$ cts.	Lbs.	Lbs.
1908.....	7 05	5 52	1.6	1.81
1909.....	0 47	5 79	.77	1.2
1910.....	1 84 (loss)	13 77	1.	1.56
1911.....	21 90	23 86	1.29	1.34
1912.....	18 13	5 68	1.4	1.04
Average for 5 years.....	9 14	11 52	1.21	1.39

These results would seem to justify the following conclusions:

1st. Steers may be fattened successfully and profitably outside in the climate of Manitoba.

2d. Greater gains at the cost of less feed can be made where the steers can be stabled.

3rd. The increased gains from the stabled steers are probably not sufficient to justify the expenditure of the necessary money to build stables for this purpose.

PRICES REALIZED FOR GRAIN FED.

The business of feeding cattle will appeal to more people as a possible means of realizing larger prices for their grain than as a separate business undertaking. If grain had to be bought for feeding, most farmers would need to be assured of certain and large profits. But if it can be shown that the oats or barley on hand can be marketed at much better prices than otherwise obtainable, it is then a proposition that appeals to everyone, and particularly to the man who is some miles from the elevator.

In order to obtain definite figures, the results of the five last years have been taken. The feeds other than grain have been counted up at the prices stated for each year, which are good prices for home-grown products, or, in the case of purchased feed such as bran, are at the actual cost. This amount, together with the purchase price of the steers, has been deducted from the receipts of the sale. The remainder has been divided by the amount of grain fed in order to obtain the price realized for the grain.

The results are as follows:

PRICES REALIZED FOR OATS.

	Fed to Outside Steers.	Fed to Inside Steers.
	Cts. per bush.	Cts. per bush.
1908.....	47	43
1909.....	36½	53½
1910.....	31	54
1911.....	95	115½
1912.....	71½	55
Average for 5 years.....	56	71

PRICES REALIZED FOR BARLEY.

	Fed to Outside Steers.	Fed to Inside Steers.
	Cts. per bush.	Cts. per bush.
1908.....	66	60½
1909.....	50	76
1910.....	43½	117
1911.....	134½	168
1912.....	101	78
Average for 5 years.....	79	100

As in the case of the other experiments, labour has not been considered. Each reader must therefore estimate how much the labour of feeding the cattle less the value of their manure is greater than the labour of marketing the oats or barley, and reduce the selling price of the grain accordingly. This will vary according to location and circumstances. While many will not agree with him, it is the opinion of the author that when the using-up of the straw and the benefit of the manure are considered, the balance will be in the favour of the steers and these prices need not be reduced at all.

But even after making a liberal allowance for the cost of labour, the prices realized for grain during these five years are very much greater through feeding it to steers than could be obtained in the ordinary way. Even in 1910, when an extravagant method of feeding was tried with the outside steers, and the results were reported as disastrous, the prices obtained were 31 cents for oats and 43½ cents for barley, which is not bad to say the least. Then in 1911 when good fortune combined with good buying and selling gave a spread of over 3 cents a lb. between the buying and selling prices, the figures obtained for the grain fed were simply fabulous.

TYPE OF STEERS.

Though no special experiment has been carried on to compare the gains made by steers of different types, it has been apparent in all the tests that steers of approved beef conformation invariably made the best gains. The kind that is wanted is the low-set, blocky animal with thick, deep body and generally thrifty appearance. Steers such as this keep in better health, have better appetites, and make better use of their feed. The other kind are wasters and it is unwise to try to fatten a bunch of scrub or dairy-bred steers. Best results can be obtained only with steers of beef breeding whose conformation indicates feeding quality.

GENERAL CONCLUSIONS.

We believe the results of these experiments justify us in recommending steer feeding to the farmers of Manitoba as a profitable line of farming. It offers a reasonable profit and a satisfactory way of disposing of farm products. It assists in the labour difficulty by providing remunerative labour in the winter, and enabling the farmer to offer year-round employment to a good man.

It enables the grain grower to return some of the lost fertility to his land in the form of manure. It provides for the profitable disposal of hay, alfalfa, corn or roots; crops that must be more largely grown before the Manitoban farmer is successful in coping with the growing evils of soil blowing and weeds.

At present, most of the cattle raised in Manitoba leave the farm in an unfinished condition. They are sold in the fall, when prices are likely to be the lowest, and are only feeders or at best fair butcher cattle. The cattle that could properly be called exporters are very few. Now there is a good demand in our cities for highly-finished beef. This demand is usually best in the spring before grass-fed stock begin to come in. These experiments and the experience of the few feeders there are, show that the farmers who sell off their thin or half-finished stuff in the fall, could do much better, provided the steers are of good beef type, by fattening them through the winter and turning them off when the market is at its best.

The most important conclusions from the experiments herein described may be briefly expressed as follows:—

1. Steer feeding may be profitably carried on in Manitoba.
2. Good results can be obtained with no other feeds than straw and grain.
3. The addition of succulent feed such as roots or ensilage improves a ration.

4. Hay and oat sheaves are very useful and give larger gains than straw.
5. Alfalfa and corn are especially valuable on account of their feeding value combined with large yields.
6. Between two and three years appears to be the best age at which to fatten.
7. Only steers of good beef type should be used.
8. There should be a margin of at least $1\frac{1}{4}$ cents per lb. between buying and selling prices in order to make a profit.
9. Steers fed loose in a box stall do better than when tied.
10. Dehorning gives little or no setback and makes loose feeding practicable.
11. Steers may be fattened successfully outdoors in winter in Manitoba, if sheltered from the wind.
12. Steers fed in a stable will make greater gains than when fed outdoors, but probably not enough greater to pay for an expensive stable.
13. Coarse grains, whether oats, barley or low-grade wheat, can be marketed more profitably through steers than through the elevator.
14. The man who raises a good steer and sells him thin or half-finished usually misses the best part of the profit on him.